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سازمان اسناد و کتابخانه ملی جمهوری اسلامی ایران

② ①

$$y = x^r - rx^r + rx$$

$$y = (x-1)^r + 1$$

$$y-1 = (x-1)^r$$

$$\sqrt[r]{y-1} = x-1 \rightarrow \sqrt[r]{y-1} + 1 = x \quad Rf = \mathbb{R}$$

$$y = \frac{1}{x^r - rx}$$

$$yx^r - rx = 1 \rightarrow yx^r - rx - 1 = 0$$

$$\Delta = b^2 - 4ac$$

$$x = \frac{+ry \pm \sqrt{ry^2 + ry}}{ry}$$

$$ry^2 - r(-1)(y) = ry^2 + ry$$

$$\begin{cases} y \neq 0 \\ ry^2 + ry \geq 0 \end{cases} \rightarrow y(ry + r) \geq 0$$

$$\begin{matrix} - & 0 & + \\ | & & | \\ 0 & - & 0 \end{matrix}$$

$$Rf = (-\infty, -1] \cup (0, +\infty)$$

$$1) y = x^r - rx + 1 \quad a > 0$$

③ ②

$$\text{ext} \left| \frac{-b}{2a} = \frac{+r}{r} = (+r) \right.$$

$$Rf = [4, +\infty)$$

$$2) y = -x^r + 4x + r \quad a < 0$$

$$\text{ext} \left| \frac{-4}{-r} = +r \right.$$

$$Rf = (-\infty, 12]$$

$$3) y = \sqrt{x^r - rx - r} \quad a > 0$$

$$\text{ext} \left| \frac{r}{2} \rightarrow [r, +\infty) \xrightarrow{\text{محدود}} [0, +\infty) = Rf$$

$$4) y = \sqrt{4x - x^r}$$

$$\text{ext} \left| \frac{-4}{-r} = +r \rightarrow (-\infty, 4] \xrightarrow{\text{محدود}} [0, r] = Rf$$

$$\text{الف) } y = x^3 - 2x^2 + 2x + 1$$

٢ ٣

$$R_f = \mathbb{R}$$

$$\text{ب) } y = x^4 - 4x^3 + 2x + 2$$

$$R_f = \mathbb{R}$$

$$\text{ج) } y = \sqrt{x^4 - 4x^3 + 2x + 2}$$

$$R_f = [0, +\infty)$$

$$\text{د) } y = (x^3 - 4x^2 + 2x + 1)^2$$

$$R_f = [0, +\infty)$$

$$\text{الف) } y = \frac{x+1}{x-2}$$

٢ ٤

$$\mathbb{R} - \left\{ \frac{a}{c} \right\} \rightarrow \mathbb{R} - \{2\} = R_f$$

$$\text{ب) } y = \frac{x+1}{x+1}$$

$$R_f = \mathbb{R} - \{2\}$$

$$\text{الف) } y = \sqrt{\frac{x+2}{x+1}}$$

٢ ٥

$$R_f = \mathbb{R} - \{2\} \xrightarrow{\text{جزئی شیب}} R_f = [0, \sqrt{2}) \cup (\sqrt{2}, +\infty)$$

$$\text{ب) } y = \sqrt{\frac{x+1}{x-2}}$$

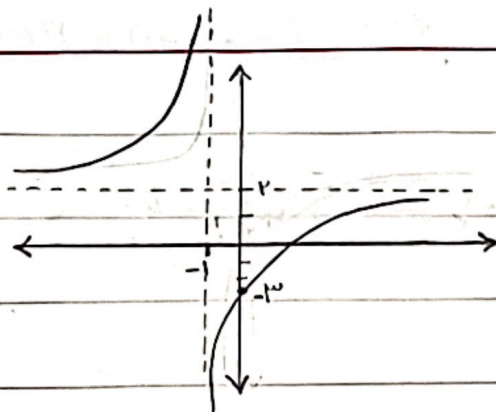
$$\mathbb{R} - \{-2\} \xrightarrow{\text{جزئی شیب}} R_f = [0, +\infty)$$

$$\text{الف) } y = \frac{x-3}{x+1}$$

٢ ٦

$$ad - bc > 0$$

$$p + q > 0$$

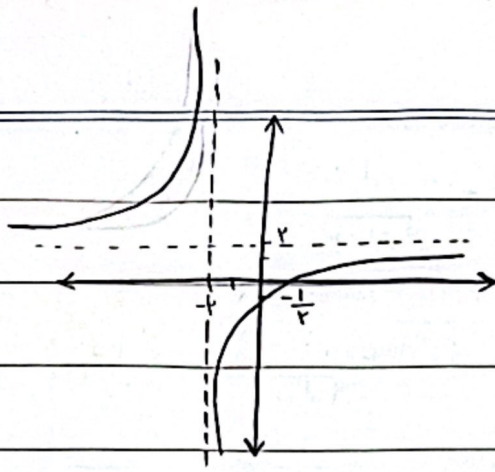


① = ریشه موج = جانب قائم

② = جانب افقی = $\frac{a}{c}$

Scanned with

$$1) y = \frac{2x-1}{x+2}$$



$$ad - bc > 0$$

$$\text{مجاہد قائم} = -2$$

$$\text{مجاہد قائم} = 2$$

$$2) y = \sin x + \frac{1}{\sin x} \quad -1 < \sin x < 1$$

$$\sin x > 0 \rightarrow [2, +\infty) \quad \sin x < 0 \rightarrow (-\infty, -2] \quad R_f = (-\infty, -2] \cup [2, +\infty)$$

$$3) y = \frac{x^4+1}{x^3} \rightarrow x^3 + \frac{1}{x^3}$$

$$\begin{aligned} x > 0 &\rightarrow [2, +\infty) \\ x < 0 &\rightarrow (-\infty, -2] \end{aligned} \quad \left. \vphantom{\begin{aligned} x > 0 \\ x < 0 \end{aligned}} \right\} R_f = (-\infty, -2] \cup [2, +\infty)$$

$$4) y = \frac{\sqrt[3]{2x+1}}{\sqrt{x}} \rightarrow \sqrt[3]{2x+1} + \frac{1}{\sqrt{x}}$$

$$R_f = (-\infty, -2] \cup [2, +\infty)$$

$$5) y = \sqrt{x} + \frac{1}{\sqrt{x}}$$

$$x > 0 \rightarrow R_f = [2, +\infty)$$

$$6) y = x^2 + \frac{1}{x^2+3} \rightarrow x^2+3 + \frac{1}{x^2+3} - 3$$

$$x^2+3 > 1 \rightarrow \frac{1}{x^2+3} > 0 \rightarrow \frac{1}{x^2+3} - 3 = \frac{1-3(x^2+3)}{x^2+3} = \frac{1-3x^2-9}{x^2+3} = \frac{-3x^2-8}{x^2+3}$$

$$R_f = [\frac{1}{3}, +\infty)$$

$$b) y = \frac{x^r + \omega}{\sqrt{x^r + k}} = \sqrt{x^r + k} + \frac{1}{\sqrt{x^r + k}}$$

$$x^r + k > 1 \xrightarrow{\text{derivative}} \sqrt{x^r + k} + \frac{1}{\sqrt{x^r + k}} \rightarrow r + \frac{1}{r} = \frac{\omega}{r}$$

$$RP = \left[\frac{\omega}{r}, +\infty \right)$$

$$y = |x - r| + |rx + k|$$

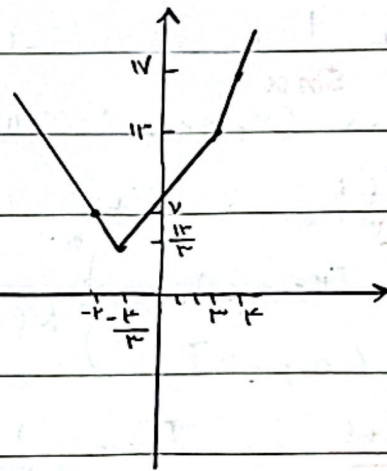
$x < -\frac{k}{r}$	$-\frac{k}{r} < x < r$	$x > r$
$-x + r - rx - k = -rx - 1$	$-x + r + rx + k = rx + k + r$	$x - r + rx + k = rx + k + 1$

$$x = r \rightarrow y = 1r$$

$$x = -\frac{k}{r} \rightarrow y = \frac{1r}{r}$$

$$x = k \rightarrow y = 1r$$

$$x = -r \rightarrow y = 1r$$



5) 4

$$ii) y = |x - r| + |rx + k|$$

$x < -1$	$-1 < x < r$	$x > r$
$-x + r - rx - k = -rx$	$-x + r + rx + k = rx + k + r$	$x - r + rx + k = rx + k + 1$

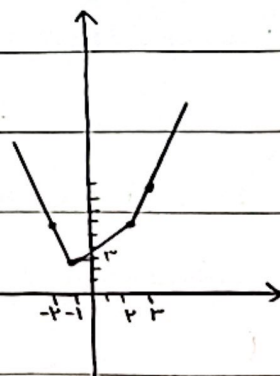
$$RP = [r, +\infty)$$

$$x = r \rightarrow y = 4$$

$$x = -1 \rightarrow y = 2$$

$$x = r \rightarrow y = 4$$

$$x = -r \rightarrow y = 4$$



5) 10

$$1.) y = |2x - 1| - |x + 1|$$

$$\begin{array}{c|c|c} -1 & 1 & \\ \hline -2x + 1 + x + 1 & 2x - x - 1 & 2x - x - x - 1 \\ = -x + 2 & = -x + 1 & = x - 1 \end{array}$$

$$x = 2 \rightarrow y = -1$$

$$x = 1 \rightarrow y = -1$$

$$Rf = [-1, +\infty)$$

$$y = -1 \rightarrow y = 1$$

$$y = -1 \rightarrow y = 2$$

